

The Oxbow

FROM THE NORTH DAKOTA STATE WATER COMMISSION

SWC develops new aquifer testing method

By Jon Patch

Whether working on large or small-scale problems of ground-water hydrology, engineers and hydrologists must have a reasonable understanding of the material through which the ground water is flowing. The most reliable means of determining these aquifer characteristics or parameters is by performing an aquifer test.

The principle of an aquifer test is simple. An aquifer test involves the pumping of a well while monitoring the effects on the ground-water levels in nearby wells. The State Water

Commission has performed hundreds of aquifer tests throughout the state as part of the County Study Program, as well as special investigations. Until recently, the method for collecting water-level data was by hand with a chalked steel tape or with “Stevens” chart recorders, using floats or water level sensors. These devices, though they have served us well in the past, are becoming obsolete and are problematic.

Because the data collected from aquifer tests are so important, the Water Commission decided to pursue and develop a new methodology for data collection—making test-

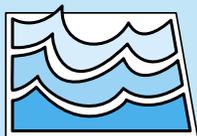
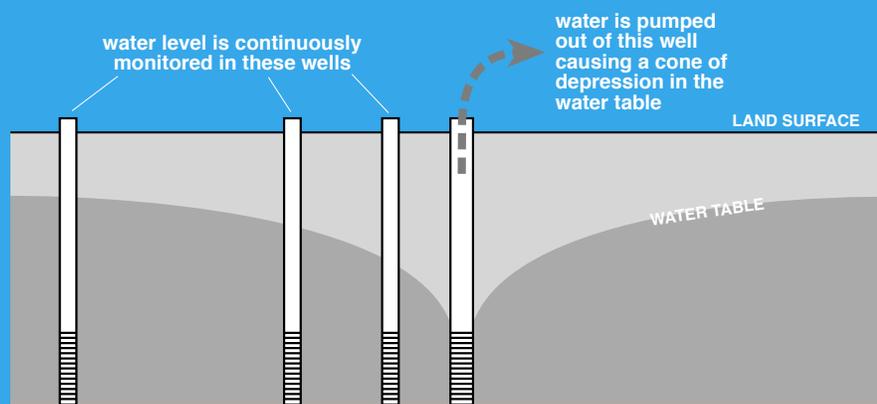
ing more accurate and efficient. This new methodology involves a combination of state-of-the-science equipment, such as highly accurate pressure-transducers, radio telemetry, and custom designed software that automatically retrieve and catalog ground water data.

The “new” setup uses *Global Water WL-15* water-level loggers. The Commission has been using these for continuous monitoring for many years but not during aquifer tests because they are designed to store the data internally and then periodically (typically days or weeks later) retrieve the data. Aquifer testing requires *real-time* data collection to ensure equipment is working properly. Losing the data from a single critical well may result in inaccurate or incomplete analyses. With the “old” methods, additional personnel were required just to monitor the charts and make periodic verifications of the water-level with a chalked steel tape. They then had to make time notations on the chart for a more accurate representation of early-pumping-time data when water levels are changing the fastest. As one might expect, this type of process was tedious and error prone.

To achieve *real-time* data collection, several off-the-shelf products were employed in this new monitoring technique. A wireless Ethernet network, consisting of an access-point with several clients (one at each monitored well), was designed to communicate with the water-level loggers. The software was designed by Water Commission staff, which directly retrieves and stores the real-time water-level measurements.

In the future, the Water Commission expects to continue to expand the use of this new monitoring technique—increasing the efficiency at which well tests are completed, while also reducing the potential for human error.

AQUIFER TEST: Water is pumped out of a well while the water level is measured in nearby wells. The data collected is used to determine the aquifer’s ability to transmit and store water.



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COMMISSION MEETING MINUTES

The ND State Water Commission (Commission), chaired by Governor John Hoeven, acted on several items of business and was given status reports on continuing water management projects and programs at the March 11, 2004, meeting in Bismarck.

In action items, the Commission:

- Approved Contracts 4 and 5 of the state's Devils Lake Emergency Outlet project. Park Construction Company was awarded Contract 4, with a bid of \$2,371,134. Contract 5 was awarded to Industrial Builders Inc., with a low bid of \$5,041,000. All construction work will be completed over the course of this year, with operation of the outlet beginning in the spring of 2005.

- Approved the award of Southwest Pipeline Project Contract 5-11 (Beach Tank), in the amount of \$429,945, to Advanced Tank and Construction of Wellington, Colorado. The tank is expected to be operational by October 1, 2004.

- Approved the award of Southwest Pipeline Project Contract 7-8A to Abbot, Arne, and Schwindt, with a bid of \$1,058,658. Contract 7-8A is for the Phase 1 Fryburg service area rural distribution system.

- Authorized the State Engineer to award Northwest Area Water Supply Project Contract 2-1C, to Winter Brother Underground, of Sioux Falls, South Dakota. Winter Brothers submitted the low bid on February 26, 2004 in the amount of \$6,088,848. Contract 2-1C consists of 61,000 feet (about 11.6 miles) of 36-inch steel or ductile iron pipe, extending from Highway 23, to the south side of Max.

- Approved a request from the Maple River Water Resource District for

additional cost-share participation in the District's Cass County Drain #14 improvement and reconstruction project. The amount of cost-share approved was in an amount not to exceed \$88,900.

- Conditionally approved a request for funding from the Southeast Cass Water Resource District, in the amount of \$75,250 for a Cass County Drain #21C improvement and reconstruction project. This approval is subject to the availability of funds, issuance of required permits, and receipt of the projects final design.

- Approved a request from the Southeast Cass Water Resource District for cost-share participation in the District's Cass County Drain #27 improvement reconstruction project. The amount of cost-share approved was in an amount not to exceed \$182,481.

- Conditionally approved a request for funding from Ransom County and the Maple River Joint Water Resource District, in the amount of \$44,546 for the district's Coburn Drain #2 improvement and reconstruction project. This approval is subject to the availability of funds, attainment of a positive local assessment vote within six months, issuance of required permits, and receipt of the projects final design.

- Conditionally approved a cost-share request in the amount of \$222,172, from the Traill County Water Resource District for a Traill County Drain #38 improvement and reconstruction project. Like most other conditionally approved requests, cost-share is subject to the availability of funds, attainment of a positive local assessment vote within six months, issuance of required permits, and receipt of the projects final design.

- Approved cost-share in the amount of \$2.5 million for replace-

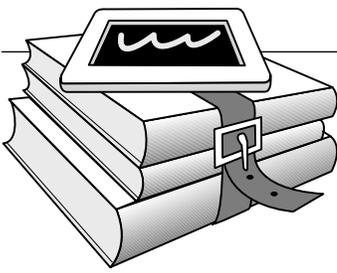
ment of the spillway and general repairs of Mount Carmel Dam. As much as \$2.9 million may be made available through the Commission if other state funding sources are unavailable.

- Approved a cost-share request from the Pembina County Water Resource District in the amount of \$200,000 for legal fees associated with a lawsuit with Manitoba regarding border dikes. The dike was constructed between 1946 and 1966 and causes considerable flood damages to North Dakota landowners. This was the first time the Commission has ever approved funding for non-project legal costs.

- Approved MR&I program grants for the Northwest Area Water Supply Contract 2-1C, Stutsman Rural Water, and Williams Rural Water expansion, in the amounts of \$1.55 million, \$24,000, and \$1,660,000, respectively.

- Approved the Drinking Water State Revolving Loan Fund (DWSRLF) comprehensive project priority list and funding list, and authorized the Department of Health to administer the 2004 Intended Use Plan. The Commission's role in the DWSRLF involves two items. First, the Department of Health must administer and disburse funds with the approval of the Commission. Second, the Department of Health must establish assistance priorities and expend grant funds pursuant to the priority list for the drinking water treatment revolving loan funds, after consulting with and obtaining the approval of the Commission.

- Approved a Resolution of Appreciation to James Landenberger for his six years of service with the State Water Commission. James is currently employed with Bartlett and West-Boyle Engineering Corporation, in Bismarck. Congratulations to James, and best of luck to him and his wife Beth in their future endeavors.



THE WATER PRIMER

How is the new Master Manual different?

By Bruce Engelhardt

After more than 14 years, the Corps of Engineers completed the review of the Missouri River Master Water Control Manual (Master Manual) in March. The Master Manual is the Corps' guide for the operation of the dams on the Missouri River. While the new Master Manual is an improvement over the previous Master Manual, the changes do not go far enough in reducing the impacts during drought.

The Master Manual contains rule curves the Corps uses to determine the amount of water released from the reservoirs to support downstream navigation based on the amount of water stored in the system on March

15 and July 1 of each year. These rule curves have navigation flow targets at four locations, Sioux City, Omaha, Nebraska City, and Kansas City. Two methods are used to conserve water: 1) shortening the length of the navigation season; and 2) reducing the navigation service level. The navigation service level is the amount of flow released to support navigation, (minimum service levels are 6,000 cfs less than full service levels).

The following are differences between the previous Master Manual and the new Master Manual.

- Under the previous Master Manual, the March 15 system storage trigger for minimum navigation service was 46 million acre-feet (MAF).

It is now increased to 49 MAF under the new plan.

- The new Master Manual completely eliminates navigation for the year if system storage falls below 31 MAF by March 15.

- The new manual also requires approval from the Secretary of the Army to curtail navigation for the second of two consecutive years.

- The new Master Manual actually reduces the July 1 flow support system storage check for full navigation service from 59 MAF to 57 MAF.

- The new Master Manual does conserve water by shortening the navigation season at higher July 1 system storage levels (51.5 MAF) than the previous manual did (41 MAF).

As a point of reference:

- Average end of April system storage is 58 MAF.

- The previous record low for system storage was 41.8 MAF, set in 1991.

- At the end of April, 2004, system storage was about 39 MAF—a new record low.

It should be pointed out that the plan supported by North Dakota would have provided additional navigation season shortening to conserve additional water. However, that plan was rejected by the Corps.



At Little Field on the Van Hook Arm of Lake Sakakawea south of New Town, the boat ramp is left high and dry after several years of drought.